

WE CLAIM

1. A method for manufacturing a multiple optical path array type probe in which in a light guiding material including a substrate that functions as a clad and a light guiding path formed of a component that functions as a core for guiding light or as a waveguide,

wherein the light guiding material includes a plurality of light guiding paths aligned to be parallel to each other within the substrate that functions as a clad, and

wherein tip end portions of the light guiding paths are sharpened through chemical etching of an end surface that is orthogonal to the plurality of light guiding paths.

2. The method for manufacturing a multiple optical path array type probe as claimed in Claim 1, wherein the substrate that functions as the clad of the light guiding material consists of pure SiO<sub>2</sub> and the light guiding paths of the light guiding material of a material in which SiO<sub>2</sub> includes components such as metal or metal oxides, and

wherein chemical etching is performed by impregnating an end surface of the light guiding material into a HF-NH<sub>4</sub> type buffer solution for a specified period of time.

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~~3. A multiple optical path array type probe manufactured by using the method for manufacturing a multiple optical path array type probe as claimed in Claim 1 or 2.~~

4. A multiple optical path array type probe in which in a light guiding material including a substrate that functions as a clad and a light guiding path formed of a component that functions as a core for guiding light or as a waveguide,

wherein the light guiding material includes a plurality of light guiding paths aligned to be parallel to each other within the substrate that functions as a clad, and

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wherein tip end portions of the light guiding paths are sharpened.

5. A multiple optical path array type probe as claimed in Claim 4, wherein the substrate that functions as the clad of the light guiding material consists of pure SiO<sub>2</sub> and the light guiding paths of the light guiding material of a material in which SiO<sub>2</sub> includes components such as metal or metal oxides.

6. A multiple optical path array type probe as claimed in Claim 4, wherein the respective light guiding paths are arranged in that an interval between mutually adjoining light guiding paths is not more than 20  $\mu$  m.

7. A multiple optical path array type probe as claimed in Claim 4, wherein the light guiding material is arranged in that a light transmittance preventing means is provided between the respective optical paths so that light is prevented from being transmitted between the respective optical paths.

8. A multiple optical path array type probe as claimed in Claim 7, wherein the light transmittance preventing means is a thin film layer made of gold.

9. A multiple optical path array type probe as claimed in Claim 4, wherein a plurality of light guiding paths are arranged in a linear form on an end surface that is orthogonal to the plurality of light guiding paths of the light guiding material.

10. A multiple optical path array type probe as claimed in Claim 4, wherein a plurality of light guiding paths are arranged in a latticed form on an end surface that is orthogonal to the plurality of light guiding paths of the light guiding material.

11. A multiple optical path array type probe as claimed in Claim 4, wherein a plurality of light guiding paths are arranged in a spiral form on an end surface that is orthogonal to the plurality of light guiding paths of the light guiding material.

12. A multiple optical path array type probe as claimed in Claim 4, wherein the probe of multiple optical path is any one of a AFM probe, STM probe

or a near-field probe.

13. A multiple optical path array type probe as claimed in Claim 4, wherein a mask of a light blocking material exhibiting ductility is formed at tip end portion of the sharpened light guiding paths, and wherein the probe further comprises holding materials for adjusting an amount of pressing, when forming an aperture of a specified size on all of the plurality of light guiding paths upon pressing the mask against a planar surface, to be of an aperture diameter that is formed upon pressing the same against the planar surface.

14. An multiple optical path array type optical head arranged to be an optical head for recording/reading information for a near-filed optical memory by using the multiple optical path array type probe as claimed in Claims 4.

15. The multiple optical path array type optical head as claimed in Claim 14, wherein the probe comprises distance holding materials for securing a distance between a tip end of the probe and a surface of a recording material for recording/reading information.

16. A multiple optical path array type fiber in which in a light guiding material including a substrate that functions as a clad elongated in a linear manner and a light guiding path formed of a component that functions as a core for guiding light into the linear substrate or as a waveguide and extending in an extending direction of the substrate,

wherein the light guiding material includes a plurality of light guiding paths aligned to be parallel to each other within the substrate that functions as a clad.

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